Client's ref.: D89085 /2001-10-30
File: 0632-6003US /Final/Amy/Kevin

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TITLE

METHOD FOR FORMING RIBS IN A PLASMA DISPLAY PANEL

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a plasma display panel (PDP). In particular, the present invention relates to a method for forming ribs in the PDP.

Description of the Related Art

Recently, a variety of flat panel displays, such as a liquid crystal display (LCD) and a plasma display panel (PDP) have been intensively developed to replace cathode ray tube (CRT) displays. In PDP technololgy, an ultraviolet light is emitted to excite the RBG phosphors for producing visible lights. The advantages of the PDP include a large display area, wide viewing angle, and intense brightness.

Usually, a PDP includes a front plate and a rear plate, the rear plate is spaced a distance to the front plate and sealed with the front plate. A plurality of barrier ribs are formed in parallel on the rear plate of the PDP. These barrier ribs are used to define a plurlaity of discharge spaces, and prevent discharge coupling and color cross-talk between adjacent cells. The traditional method for forming the ribs is described hereafter with FIGs. 1A and 1B.

As shown in FIG. 1A, the address electrodes 12 are formed on the rear glass substrate 10. The dielectric layer 14 is

further formed to cover the address electrodes 12. The rib material layer 18 is formed above the dielectric layer 14. The photoresist dry film is laminated on the rib material layer 18. After an exposure and development process, the photoresist dry film 20 is patterned as shown in FIG. 1A.

Referring to 1B, the photoresist dry film 20 is used as a mask in a sandblasting process, and the rib material layer 18 is patterned by the sandblasting process to form the ribs 18a.

In the above-mentioned conventional method, the dielectric layer 14 under the rib material layer 18 can protect the address electrodes 12 from damaging in the sandblasting process. However, a high temperature sintering process is required after the dielectric layer 14 is printed on the substrate 10. The sintering step will lengthen the manufacturing time and affect the yield of the PDP. In addition, the height of the ribs 18a is about 100~200 μm, so the sandblasting time is too long to keep the uniformity of the ribs 18a. Therefore, the discharging efficiency is decreased when these ribs lack uniform bottom width and the profile. A method for forming ribs of a plasma display panel is needed to solve the above-mentioned problems.

SUMMARY OF THE INVENTION

The present invention provides a method for fabricating ribs of a PDP, in which the top width, the bottom width, and the profile of the ribs can be effectively controlled, and a thermal step can be saved.

The present invention provides a method for forming ribs in a plasma display panel (PDP). The PDP includes a glass substrate, and a plurality of address electrodes are formed on

the glass substrate. A dielectric layer is formed above the address electrodes and the glass substrate. A plurality of sandblasting stoppers are formed on the dielectric layer, and the positions of these stoppers are corresponded to that of the address electrodes. The rib material layer is further formed to cover the dielectric layer and the sandblasting stoppers, and then a plurality of sand-resists are patterned on the rib material layer. By using the sand-resists as a mask, a sandblasting process is executed to form a plurality of ribs and expose the sandblasting stoppers. After removing the sand-resists and the sandblasting stoppers, the structures of the ribs are fixed by a sinter process.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will become more fully understood from the detailed description given herein and the accompanying drawings, given by way of illustration only and thus not intended to be limitative of the present invention.

Figs. 1A~1B show the method for fabricating ribs of the prior PDP;

Figs. 2A~2G are the method for forming the ribs of the PDP according to the present invention; and

FIG. 3 shows another structure of the rib in the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

A detail description of the method for forming the ribs in the PDP of the present invention is given hereafter with reference to Figs. 2A~2G.

Referring to FIG. 2A, the address electrodes 102 are formed on the glass substrate 100. The dielectric layer 104 can cover and protect the address electrodes 102. The dielectric layer 104 can be formed by screen-printing. Note that the dielectric layer 104 is not strengthened by a sinter process.

As shown in FIG. 2B, the photosensitive dry film 106 is formed on the dielectric layer 104. The photosensitive dry film 106 is formed as thin as possible, and the thickness of the photosensitive dry film 106 is preferably about 5~30 μm. The photosensitive dry film 106 can be negative type photoresist and formed by laminating.

Referring to FIG. 2C, the photosensitive dry film 106 is patterned to form the sandblasting stoppers 106a. The positions of these sandblasting stoppers 106a may be corresponded to that of the address electrodes 102. The underlying dielectric layer 104 has not been sintered at this moment, so the structure of the dielectric layer 104 is not rigid enough. In addition, the width of each sandblasting stoppers 106a should be not smaller than that of the underlying address electrode 102 so as to protect the address electrodes 102 and the unsintering dielectric layer 104 during the following sandblasting step. Furthermore, the interval between two sandblasting stoppers 106a is substantially equal to the bottom width of each rib which is formed by the subsequent process.

A rib material layer 108 is formed above the dielectric layer 104 and the sandblasting stoppers 106a. The thickness of the rib material layer 108 is about 100~200 μm.

As shown in FIG. 2D, another photosensitive dry film 110 is formed on the rib material layer 108. The thickness of the photosensitive dry film 110 is about 30~100 μm.

As shown in FIG. 2E, the photosensitive dry film 110 is patterned to form a plurality of sand-resists 110a. The sand-resists 110a and the sandblasting stoppers 106a are formed in an interlaced configuration. That is, each sand-resist 110a is disposed between two sandblasting stoppers 106a.

In this embodiment, as shown in FIG. 2E, a horizontal distance d_1 is defined between one side of one sand-resist 110a and the adjacent sandblasting stopper 106a. The distance between the other side of the sand-resist 110a and another adjacent sandblasting stopper 106a is also equal d_1. The horizontal distance d_1 is not less than zero. The gap between two neighbor sandblasting stoppers is defined as d_2.

With reference to FIG. 2F, by using the sand-resists 110a as a mask, a sandblasting process is conducted to removed parts of the rib material layer 108 uncovered by the sand-resists 110a to form the ribs 108a and expose the sandblasting stoppers 106a. Moreover, the bottom width 108' of each rib 108a is substantially equal to the gap d_2 between two nearby sandblasting stoppers 106a.

Referring to FIG. 2G, the sandblasting stoppers 106a and the sand-resists 110a are peeled off. Next, these ribs 108a and the dielectric layer 104 are sintered at the same time to strengthen their structures. The manufacturing process of the rear panel is completed. Because the ribs 108a and the dielectric layer 104 are sintered at the same time by the same process, the time of the sintering process can be reduced,

resulting in decreasing the production cost and improving the performance of the PDP.

It should be noted that the bottom width 108" of each rib 108a is related to the gap d_2 between two sandblasting stoppers 106a, and the top width 108' of each rib 108a depends on the interval between two sand-resists 110a. Therefore, the bottom width 108" and the top width 108' of each rib 108a can be adjusted by the intervals of the sandblasting stoppers and the sand-resists according to the demands of the PDP. The shape of each rib 108a is also varied. The ribs 108a are shaped according to the shapes of the sandblasting stoppers 106a and the sand-resists 110a.

As shown in FIG. 3, each rib 108a has a curved sidewall. In such an example, when the dimension of the glass substrate 100 is fixed, the width of each sandblasting stopper is enlarged in order to reduce the width of each rib 108a. Therefore, the discharging space of each discharging cell 120 is increased, thus the luminescence efficiency is enhanced. The brightness of the PDP is further improved and the electric power is saved.

The ribs 108a can also be shaped as traditional straight sidewalls.

According to the present invention, the ribs and the dielectric layer above the address electrodes are sintered at the same time. One sinter step for only sintering the dielectric layer is reduced, resulting in decreasing the cost and improving the performance of the PDP.

Further, the ribs can be shaped by different widths of each sandblasting stopper and each sand-resist. The bottom widths and the profiles of these ribs can be unified by these sandblasting stoppers and the sand-resists. Moreover, the

discharging space of each discharging cell can be increased by narrower ribs. Therefore, it enhances the brightness of the PDP and saves electric power without sacrificing the stability of the ribs. Thus, the space of each discharging cell is enlarged and these discharging cells have better uniformity.

While the present invention is described by preferred embodiments, it should be understood that the invention is not limited to these embodiments in any way. On the contrary, it is intended to cover all the modifications and arrangements as they would be apparent to those skilled in the art. Therefore, the scope of the appended claims should be interpreted in the broadest sense so as to encompass all the modifications and arrangements.